JPRS L/10665

16 July 1982

USSR Report

TRANSPORTATION

(FOUO 5/82)

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APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500080039-6

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MOTOR VEHICLE

COSTS OF ROAD CONSTRUCTION IN WESTERN SIBERIA DISCUSSED

Moscow NEFTYANAYA PROMYSHLENNOST' SERIYA NEFTEPROMYSLOVOYE STROITEL'STVO in Russian No 3, 1982 pp 3-5

[Article by A. G. Chudinovskikh and M. I. Merkushev from the Giprotyumenneftegaz [State Institute for the Design and Planning of the Tyumen' Oil and Gas Industry] SOPS [Council for the Study of Production Forces] of the USSR Gosplan: "Motor Vehicle Roads of Various Designs in the Oil and Gas Fields of Western Siberia"]

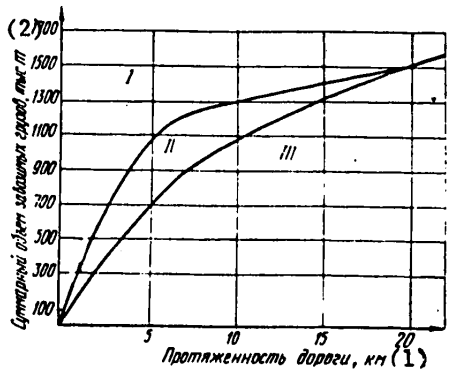
[Text] One of the important problems in opening up the oil and gas fields of Western Siberia is choosing efficient road designs. A number of researchers consider that it is necessary to build only dirt roads for delivering freight to the oil fields. This is because major roads will not be fully used as the fields are developed and the cost of constructing major roads is 600,000 to 800,000 rubles per kilometer. The needs of oil and gas fields for freight transport can also be met by using winter roads and by developing cross-country transportation. Sometimes it is expedient to accelerate development of hard-surface motor vehicle roads.

Let's examine the areas of most efficient use of various kinds of motor vehicle roads in Western Siberian conditions. It is well known that using the more capital-intensive road designs permits a future reduction not only of specific transportation expenditures, but also of the long-range need for motor vehicle equipment. There is an inverse relationship between expenditures for road and motor vehicle facilities: as expenditures for developing a road system are decreased, expenditures for developing the motor vehicle industry and facilities are increased. Thus, it is expedient to find the optimum combination of construction and operational expenditures for road facilities and expenditures for purchasing and maintaining motor vehicle equipment, so their overall total will be minimal.

In transporting freight, the correlation between transport and construction expenditures is mainly determined by the overall volume of delivered freight and the road length. Zones have been defined for expedient use of hard-surface road designs, dirt and log roads and winter roads, depending on these parameters and also based on calculated technical and economic indices which were obtained statistically for the regions being considered. This research was conducted in the SOPS of the USSR Gosplan, based on data obtained by Giprotyumenneftegaz.

In computing the cost of building and maintaining roads, consideration was given to their type, standard service life, and expenditures for renovating those roads whose service life was less than the calculated period for opening up and exploiting oil fields (in the calculations, the period was equal to 40 years). For a comparison, roads in categories III, IV and V, with reinforced concrete surfaces, were assumed (Construction Norms and Rules, Part II, Section D, Chapter 5. "Avtomobilnyye dorogi. Normy proyektirovaniya." [Motor Vehicle Roads. Planning Norms] Moscow, USSR Gosstroy, 1973). Based on a permissible traffic intensity and its computed value for the overall freight traffic being analyzed, the necessary number of traffic zones across winter roads and dirt roads was selected.

Graph. Zones for Expedient Use of Road Designs, Depending on Road Length and Overall Volume of Delivered Freight



Key:
1. Road length in kilometers
2. Overall volume of delivered freight in thousands of tons.

The mean weighted values of road designs under the geomorphological conditions of the lay of existing routes in the regions being examined were taken as indices for the cost of building and maintaining roads. The correlation of transport and construction expenditures for type III bogs were not examined, since the Western Siberian territory is characterized, to a considerable extent, by non-uniformity.

Setting up and operating a motor transport system in the oil-extracting areas of Western Siberia has its own regional specificities. All the existing and planned roads in those areas are characterized by a production orientation: the freight traffic along the roads is strictly directed towards the oil fields and inter-industrial facilities. The basic volume of freight is during the period when the oil fields are being opened up; later, transport falls off sharply and ceases when the oil field is depleted if the field is the only terminal point for a road in question. Therefore, the service life of roads cannot exceed the overall period of operation for the oil fields which they serve. These peculiarities were taken into account while

determining the calculated dynamics of freight delivery and the ensuing traffic intensity.

The dynamics of freight delivery depend on a number of various factors.

Distorting the dynamics of delivered freight has an impact on overall transport expenditures (insofar as the method of discounting cost indices was widely used in the calculations). It was established that distortion of transport expenditures for individual freight traffic volumes which were examined did not exceed 10 percent of their calculated value.

To calculate the transportation component of freight shipment expenses, the method of defining technical and operational indices for rolling stock was used (M. S. Khodosh, "Gruzovyye perevozki, avtomobil'nyye perevozki" [Freight Traffic, Motor Vehicle Traffic] Moscow "Transport", 1980). While making this calculation, expenditures for repeated shipments of freight and transport of workers' crews, duty crews and others were taken into consideration, in addition to expenditures connected with transporting needed industrial freight.

Zones for expedient use of road designs, depending on road length and the overall volume (during the entire period of drilling, building up and exploiting oil fields) of delivered freight (see the graph). It is obvious from the graph that type II dirt roads are transitional from type III winter roads to type I hard-surface roads. The zone for expedient use of type II extended in a narrow band and was limited to an overall freight volume of 1.4 million tons, with a road length no greater than 18 kilometers.

The zone for expedient use of type III winter roads extended along the x-axis. These roads can be efficiently constructed when there is a substantial distance to haul small-volume freight (overall limit 3 million tons). Beginning with a route length of 80 to 100 kilometers, the limiting line for use of winter roads is parallel to the x-axis, that is, any increase in freight traffic necessitates construction of hard-surface type roads.

When the overall freight traffic exceeds 3 million tons, it is expedient to construct type I hard-surface roads.

The most complicated problem is selecting the type of road designs for a freight delivery distance of up to 20 kilometers and freight traffic up to 1.4 million tons. For each specific instance, special calculation must be performed.

The zones, represented in the graph, for expedient use of road designs, can be modified when specifying the area of road construction, the geomorphological conditions, and when considering indirect effects arising in adjacent branches, under the influence of selective variants for road and industrial construction. In the future, we must explain, first of all, how the limits of the zones under consideration are modified when there are changes to the technical and economic parameters on which the calculations

are based. Secondly, we must study the change in zone limits when there is an additional calculation of indirect effects, connected with the use of scarce road construction materials, with the additional use of manpower, with the impact of an accepted decision on the effectiveness of developing branches of specialization, etc.

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CSO: 1829/211

MOTOR VEHICLE

TRUCK USE PROFITABILITY REPORTED

Kiev SPRAVOCHNIK PO RENTABEL'NOSTI EKSPLUATATSII GRUZOVYKH AVTOMOBILEY in Russian 1980 (signed to press 19 Feb 80) pp 2-5, 159-160

[Annotation, introduction and table of contents from HANDBOOK ON PROFITABLE TRUCK USE]

[Text] This handbook presents data for selecting a truck model to conform to specific operating conditions, and for effectively performing particular transport processes and calculating the optimal driver work norms. Tables are presented for the most widely used makes of van-type trucks and dump trucks, and also for tractor and semi-trailer rigs. The handbook is intended for engineering and technical personnel of the motor transport industry and the planning organizations, and may be helpful for VUZ students studying corresponding specialties.

Resolution No 695 of the CPSU CC and the USRR Council of Ministers, dated 12/07/79, "On Improving Planning and Strengthening the Effect of the Economic Mechanism in Raising production Effectiveness and Work Quality" is contributing to accelerated resolution of the task posed by the 25th CPSU Congress relating to further improvement of planning and control of the national economy. The measures outlined by the resolution and directed toward better planning are based on consistent implementation of the socialist economic principles.

One of the basic ways to improve planning and raise the effectiveness of truck transport operations is extensive use of the economic-mathematic methods and computer-based aids in the planning and the management decision making process. Comprehensive efforts are being made in the Ministry of Motor Transport of the UkSSR to improve the forms and methods of control on various levels. The introduction of computer-based automatic control systems (ACS) will contribute to the identification and most rational utilization of the materiel, labor and financial resources of the industry. This program is being carried out in the framework of a unified objective-oriented program for automation of control of the industry and will form the basis for the organization in the future of a unified automated system for data collection, storage and processing and control of the industry.

The first operating phases of the ACS in the Kiev, Donets, Odessa and Vinnitsa truck transport administrative regions are assisting in the solution of the many problems of optimal planning of the transportation of materials, petroleum products and small cargo shipments to the trade network of the cities of the republic, planning for the requirements relating to petroleum products, tires and so on. The quality and rationality of the plans are improved when solving the technical-economic planning problems with the aid of computers, since the entire range of factors influencing the various indexes of motor transport operations is taken into account and the resources are utilized more rationally. For example, thirty thousand fewer trucks were required for transporting sugar beets during the 1978 harvest period on the basis of the calculations made of the transport vehicle requirements.

Solution of the questions of daily planning of freight shipments requires a data base for analyzing and selecting the optimal shipment variants. At the present time the volume of this data base is still inadequate for operating the Joint Data Processing Centers (KIVTs) and the ACS. We hope that the data presented herein will in some degree broaden the data base and that the use of these data will contribute to adopting unified planning standards for motor transport vehicle profitability for all the KIVTs and the computer centers, which will reduce significantly the volume of effort involved in daily shipment plans, in economic plans and financial calculations and in the analysis of expected results from the operations of the enterprises, their subdivisions (truck convoys and truck operating brigades) and individual trucks.

The profitability of motor transport under various shipping conditions is evaluated according to actual data on the operation of several thousand trucks. We consider the latest changes in the regulations (tariffs, prices, norms and so on) and also the results of experimental use of the handbook data under the specific conditions of operation of the motor transport enterprises and the KIVTs of the Vinnitsa Motor Transport Administrative Region, where these data have received a favorable evaluation and are being used with success at the present time.

Truck profitability has been analyzed for the various truck models with mileage utilization factors ranging from 0.5 to 1.0 (0.45 in mining operation operations) and trip lengths from one to 100 km. The data are presented for freight classes I and II. Calculations were not made for freight classes III, IV, V, since their share in the overall volume of freight carried is insignificant.

In calculating the data of the tables for class I freight, we used a truck capacity utilization factor of 1.0; for class II freight, we used 0.71.

In the calculations, we used the following block speed norms: in the city 23 km/h for trucks and truck trailers with a capacity of 7 tons; 22 km/h for units with capacity over 7 tons; outside the city on group I roads, we used 42 km/h; on group III roads, 25 km/h. For mining operations, the theoretical truck mileage norms were taken to be 40 percent lower than those established for unpaved rural roads.

The norms for vehicle delays in performing loading and unloading operations are based on pricing document No 13-01-02: "Unified Truck Freight Tariffs" with the use of mechanized loading and unloading.

The following conventions are used in the tables: T_t is the turnaround time, hours; S_v is shipment volume, tons; F is freight turnover, ton-km; E_d, E_f, E_l, E_{ti}, E_{oc}, E_{mo}, E_r, E_{ov} are respectively the expenditures on driver pay including bonuses, motor fuel, lubricants, tire wear and repair, operational repair and servicing, allowances for major overhaul, allowances for reconditioning, overhead, rubles; ΣE is the sum of all the costs, rubles; I_s is the income from shipments, rubles; C_{rc} are the charges for road construction, rubles, constituting 20 percent of the income obtained in the process of operation of the motor transport fleet.

Comments and suggestions should be directed to: 252601, Kiev, 1, GSP, Kreshchatik, 5, Tekhnika Press.

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CSO: 1829/236

RAILROAD

INSTRUCTIONS FOR USE, TABLE OF CONTENTS OF PASSENGER TRAIN SCHEDULE

Moscow RASPISANIYE DVIZHENIYA PASSAZHIRSKIKH POYEZDOV (KRATKOYE) NA 1981-1982 in Russian (signed to press 4 Aug 81) pp 1-5, 384

[Instructions for use and table of contents of book "Short Schedule of Passenger Train Traffic for 1981-1982," edited by B. A. Taulin, Izdatel'stvo "Transport", 50,000 copies, 384 pages]

[Text] How To Use the Train Traffic Schedule

Numbering of Trains

Each train is given a special number, even or uneven, which defines its category (Nos 1-98 are express trains, Nos 101-698 are passenger trains, Nos 6001-6998 are suburban trains, Nos 951-968 are mixed freight-passenger trains, and Nos 901-948 are mail-baggage trains).

Train numbers were established on the following principles: (1) one integer indicates that number under which the train departs from the original station and arrives at the final station of its route; (2) a train number which has fractional digits indicates that the train number changes from even to odd or odd to even along the route depending on the established numbering of trains in the sections; the numerator indicates the train number under which it departs from the initial or final station.

Table Numbering

The table numbers are assigned to particular units consisting of one or several rail sections. Table numbers omitted from the order have been left open deliberately in order to be used later when other trains are included in the schedule.

Time Used on USSR Railroads

The computation of time for all USSR territory is done according to the international system of time zones except that in all zones (from the second to the 12th) clocks are moved one hour forward compared to the international zonal time.

Moscow time is used universally in the USSR railroad system. Moscow time differs from East European time by one hour and from Central European time by two hours.

To convert the train schedule to local zonal time, it is necessary to add to Moscow time (the second zone) one hour in the third zone, two hours in the fourth, three hours in the fifth, and so on.

If we know the zone in which the particular station or city belongs and add to the time indicated in the schedule the train number minus two we will obtain local time; conversely, if we know local zonal time and subtract the number of the zone minus two from it, we will obtain Moscow time.

Hours and minutes in the schedule are always shown in Moscow time (unless there is a special reservation).

Days are counted from zero (24 hours 00 minutes) to 24 hours.

The time zones of the USSR are shown on the map of railroads appended to the schedule.

Explanation of Symbols and Abbreviations Found in the "Schedule"

Days of the Week:

Monday — 1
Tuesday — 2
Wednesday — 3
Thursday — 4
Friday — 5
Saturday — 6
Sunday — 7

"Chet." — even numbers
"Nech." — odd numbers
V or Λ — train does not go to the station
— (dash) — train does not stop
* — brief train stop not precisely fixed by the schedule
+ — runs in summer
++ — runs in winter

For the Passenger Train Traffic Schedule (Terminals in the City of Moscow, pp 6-10): Types of Cars in the Train

"VR" — dining car
"KB" — car with buffet compartment
"SV" — first-class sleeping car with double compartments
"M" — first-class car with four-person compartments and reserved berths
"P" — second-class car with reserved berths
"Zh" — second-class, non-reserved car

In the Station Name Column:

"Ot." or "Otpr." — departure
"Pr." or "Prib." — arrival
"Pl." — station platform

In the Headings of the Tables of Train Schedules

The upper part of each table indicates the name of the company train, its category, the number under which it travels in one direction, the number of the train traveling in the opposite direction, the terminal points of its circulation, and a brief indication of the days on which the train travels.

The numbers found after the names of the train routes or after the indication of their period of operation have the following meanings:

1) the train operates throughout the entire summer period, that is, in June, July, and August; the period of operation of the train may change later depending on the flow of passengers;

2) the train operates in July and August;

3) the train operates only in August.

Trains not marked by the numbers 1), 2), and 3) are circulating constantly during the effective time of the schedule.

How To Find Train Departure or Arrival Times for Any Station

To find the table in which a particular station is included one should first find the name of the station in the alphabet and then find the appropriate table by the number set alongside the station name. It must be kept in mind here that the reference numbers do not indicate pages, but rather table numbers.

After finding the table which includes the necessary station, one should look at the vertical columns to the left and right of the station name, which show train numbers and the times that they pass each station. If there is a dash (—) opposite the station, this means that the particular train does not have a stop; if the abbreviations "Pr." or "Ot." are next to the station this means that the indicated time corresponds to the arrival or departure of the train; the symbols V or Λ mean that the particular train does not pass through the particular station; the symbol * indicates a brief stop by the train not exactly recorded in the schedule. In the tables of schedules compiled for trains traveling in both directions, the schedule of trains placed on the left must be read from top to bottom, while the trains on the right are read from the bottom to the top. Some tables with a large number of trains in a section are compiled separately for each direction of travel, in other words, trains are put only on the right of the station name; the time of train travel in these tables must always be read from top to bottom. The symbol ' is added above the table number for the numbers of tables showing the opposite direction.

How To Compile a Trip Route

To compile a route for a trip by train, from the map of USSR railroads appended to the schedule one must select the most appropriate direction and write down in sequential order the numbers placed along the rail lines. The schedules of trains

printed in the reference tables under these numbers will give the complete trip along the chosen route. When compiling the route of a trip one must keep in mind that the shortest distance is not always the fastest in time. Therefore, one must pay attention to particular cars that travel without transfers (the Table of Non-Transfer Travel by Particular Cars).

How To Determine the Cost of a Trip to Passengers

To calculate the cost of a trip to passengers one must add up the number of kilometers shown in the tables for the selected route and then, after obtaining the total distance, use the calculation tables in the section "Rail Passenger Rates" to determine the cost of travel to passengers. It must be kept in mind that when adding distances the total number of kilometers does not always correspond to the tariff distances (some distances such as short trips to deadend stations and travel through large junction points such as the Moscow and Leningrad rail centers are not counted). Therefore there may be a slight difference between the distance determined on the basis of tables in the schedule and the distance shown in Tariff Manual No 4, which is the basic manual for calculating the amounts that passengers pay to travel by Soviet railroads.

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